U. S. Department of Agriculture, Forest Service
Lake States Forest Experiment Station 1/

Station Paper No. 6 January 1947

SOME FOREST-WILDLIFE PROBLEMS IN THE LAKE STATES 2/

Shaler E. Aldous
U. S. Fish and Wildlife Service

Forests consist of more than trees; they are communities of interrelated organisms living together. Trees are only one part of this community. All these organisms influence each other. Considerable study of these interrelationships has been made, but we still do not understand all the basic biological factors that govern them. Our efforts have been concentrated on the more obvious causes and effects.

The animals in the forest are a part of the community. We must understand their influence in this association as well as the effects of silvicultural practices on animal life before a thorough and basic knowledge of forest management is possible.

Since 1930 biologists of the Fish and Wildlife Service (formerly the Biological Survey) have been studying some of the animals in the forests of the Lake States. Lack of personnel and funds have limited this work, but we have uncovered some basic information, developed new technics, and added considerably to the general knowledge of animal habits and relations in this territory.

1/ Maintained at University Farm, St. Paul, Minnesota, in cooperation with the University of Minnesota.
2/ Paper delivered on December 18, 1946, at Forestry Seminar of the Lake States Forest Experiment Station and Division of Forestry, University of Minnesota.

The importance of this work and the urgent need for its continuation perhaps can best be illustrated by a review of the problems that exist and the accomplishments that have been made. For simplification the dominant animals or groups are discussed separately, although there is a certain degree of interrelationship between animals that influences the overall picture.

Snowshoe Hares

Perhaps the "number one" animal pest to the Lake States forester is the snowshoe hare. This little mammal goes through periodic fluctuations of great abundance and extreme scarcity, the time between maximum peaks being approximately 10 years. The last peak was reached in 1943 and 1944 and was much lower than during the previous two irruptions. During the times of abundance the hares cause widespread and severe damage to small reproduction and especially to coniferous plantations. This damage is so great that it is impractical to plant other than open sites during the peak of the cycle. White spruce is the only commonly planted species that can be set out in brushy areas with any degree of certainty that it will escape destruction. Even this species is often badly damaged. Snowshoe hares haunt the brushy areas, and prefer the cover provided by stands of alder, hazel, aspen reproduction, and balsam fir. They feed on the conifers in the following order of preference: jack pine, white pine, red pine, and white spruce. With a knowledge of habitat preferences of the hares and site preferences of the different species of trees, it is possible to determine the chances for a successful plantation.

Repellent sprays applied to planting stock before it is lifted from the nursery offer effective protection until the appearance of new growth which the hares will clip. Sprayed trees, even though clipped, have a greater chance of survival than those unsprayed, because the clipping is

less severe. Sprays are recommended for fall-planted trees as a protection not only against hares but also against transpiration losses. On one plantation of fall-planted red pine that went through a dry winter the sprayed trees had an 80 percent survival as compared to a 12 percent survival among unsprayed trees planted in alternate rows.

Further study of the snowshoe hare is needed; possibilities of controlling hare damage to the forest seem reasonably good. In the meantime there is only one way to avoid excessive hare damage. It is to concentrate planting in the brushy areas during the low periods of the animal cycle and plant the open areas when the hares are abundant. However, this recommendation is difficult of application because nursery production must be scheduled several years in advance, and open areas require different species than brushy areas.

Control of the hares by poisons is possible, but until public sentiment towards this action is more favorable, this measure can not be considered a workable solution.

Cottontail rabbits do not occur in sufficient numbers in the northern part of the Lake States to be of any concern. However, in the southern parts of Wisconsin, Minnesota, and Michigan they may be an important factor in inhibiting hardwood reproduction and in establishing plantations. No detailed studies of this relationship have yet been made.

White-tailed Deer

The white-tailed deer probably presents the second most important animal problem to foresters in this region. In recent years deer have become more abundant over the Lake States generally than for any period since settlement. Logging operations and fires created ideal habitats for them and they increased steadily. In local areas deer are a greater menace to forest plantations than showshoe hares. Their numbers do not fluctuate greatly from year to year, and their browsing on trees on trees extends over a longer period, since they clip the trees as long as they are within reach.

Deer prefer tree species in about the same order as hares. However, since movements are not so restricted by habitat, it is impossible to plant or grow trees where deer cannot get at them. Deer damage can be grouped into three categories; (1) killing, (2), growth retarding, and (3) deforming. Most of the mortality occurs on small trees before they are able to withstand heavy browsing. On established trees the removal of terminal shoots tends to make them bushy and general browsing reduces the vitality of the trees.

Natural reproduction of northern white-cedar is retarded by deer more than by any other factor. This is their most nutritious feed and is highly palatable. Wherever deer are plentiful, white-cedar reproduction will not become established.

A browse survey method has been developed which makes it possible to appraise deer concentration areas and ascertain whether or not their numbers are in balance with the available food supply. The survey is made on a sample plot basis. The number of plots necessary is determined by the size of area to be appraised. The density or availability and the degree of browsing or utilization is recorded for each plot. An analysis of the accumulated figures gives a direct index of the browse situation in the surveyed area. From this, recommendations on the management of the deer herd can be made without having any figures on the actual deer population. The management of deer and most of the other game species can be effective without having population figures. It is only necessary to know whether the population is in balance with the available food supply, below or in excess. Wherever heavy or even moderate browsing is found, it can be assumed that coniferous reproduction, other than spruce, will have little chance of survival. The solution to the deer problem is to keep the herd controlled so that their numbers are commensurate with the food supply. Larger deer herds might be tolerated in limited areas where game management is given priority in a multiple land use policy. However, very few areas are now so designated although many more are needed.

Small Rodents and Birds

The role of small rodents and birds is often overlooked by foresters for at least two reasons: (1) they are small and inconspicuous and (2) little is known about their habits. It is a common assumption that birds are beneficial and rodents detrimental to the forest. This is true in some cases but false in others. Quite a number of our small seed-eating birds destroy pine seeds. Their habits are sometimes far from insectivorous. On the other hand, we have learned that certain small rodents are voracious eaters of insects at times and that seeds are not their sole food.

An examination of the stomach contents of 159 chipmunks collected in the forests of northern Minnesota showed that 71 percent of them had been feeding on insects and spiders. Some animals had consumed as many as 162 grasshopper eggs at one feeding. On the other hand, in jack pine slash areas these little rodents often become heavy eaters of jack pine seed. From 88 stomachs of chipmunks caught in a slash area, 72 percent had eaten these seeds. One specimen had the remains of 796 jack pine seeds in its stomach. Goldfinches are not wholly beneficial. On this same slash area 8 goldfinches were collected, and all had jack pine seeds in their stomachs and very few insects. The potential influence for good or harm by birds or rodents is largely dependent upon the management practiced on a given area or the stage of development of the forest.

If an attempt is made to start a new forest by direct seeding or natural seeding, these animals may prevent success. If the forest is already established, more than likely these small animals are a distinct benefit to it.

Further study, especially as to the harmful effects of these animals in preventing natural regeneration of forests is needed, and is being continued as part of the Wildlife Research program in the Lake States.

Porcupines

Porcupines have received very little attention by biologists in the Lake States. Some foresters consider them highly injurious while others think they are of little importance. We know that these animals do considerable damage to individual trees by stripping off the bark, but just how extensive the damage is not yet known. The trees most commonly damaged are tamarack, jack pine, white pine, hard maple, yellow birch, and red pine.

A study of the porcupine is now being inaugurated and from it information on the following points will be obtained:

1. The concentration of porcupines by forest types, expressed in terms of animals per unit of area.
2. An appraisal of food preferences.
3. An appraisal of timber damage by species.
4. Life history data.

Recently attention has been called to damage by tree squirrels that had apparently previously been attributed to porcupines. During late winter or early spring the squirrels sometimes remove the bark from sections and sometimes the entire tree. Sugar maple is one of the chief species damaged by squirrels. Further information on the extent of squirrel damage is needed before it can be properly appraised.

Beaver

The beaver is a true resident of the forest, sometimes to the regret of foresters. In the big spruce bog section of North Central Minnesota these animals are entering into direct competition with forest production. Many black spruce stands, merchantable for pulpwood and Christmas tree areas, are being flooded and killed by the beavers occupying the drainage ditches in that area.

Prior to draining this bog area, there were very few beaver because natural waterways and suitable food were not available. The construction of drainage ditches threw up mineral soil on which good stands of aspen and willow became established. The ditches are dammed by the beaver to create

suitable water habitat, and the aspen and willow are supplying them with food. The impounded water has raised the water table to such an extent that considerable timber has been killed.

This brings up a very important problem which only a careful analysis can solve. We must know the value of the losses caused by beaver, the value of the raised water table -- especially in drouth periods for fire control, and the economic value of the beaver.

In forested areas, other than flat bogs, the status of the beaver is not so controversial. There is some disagreement regarding the beaver's effect on trout, but this is of local importance.

Food utilization studies of the beaver have been made, but more data are needed on the value of beaver as agents for converting low value aspen into high value fur. From past studies we can determine the quantity of food available in various sized aspen (their main food in the Lake States) and thus roughly estimate carrying capacity. But until further studies are made of beaver food requirements, these carrying capacity figures are only approximate.

Isle Royale Wildlife Problem

There exists a serious problem with moose and beaver on Isle Royale National Park. This Park is under the jurisdiction of the National Park Service and presents a forest-wildlife problem, the study of which can be applicable to situations elsewhere. A moose herd that once built up to such a point that starvation reduced it to a mere remnant is again ascending to a peak population. Browse surveys and airplane counts of moose show that the situation is becoming more serious. Certain browse species including balsam fir, white pine, white birch and aspen are being prevented from reproducing and in time will be practically eliminated from the island flora. The browsing by moose is preventing the reproduction of the best beaver foods, and the excess beaver population is fast depleting the mature trees of these species. This is one of the best examples in the United States of an animal moulded environment.

Bibliography

For those who might be interested in going deeper into the findings of the work on forest wildlife research conducted under the McSweeney-McNary law at the Lake States Forest Experiment Station, the following chronological bibliography is appended.

Anon.
1930 By the Forest Ye Shall Know the Birds. Technical Note No. 27, September 1930, Lake States Forest Experiment Station, St. Paul.

——— 1934 Control of Rabbit Injury. Technical Note No. 82, May 1934, Lake States Forest Experiment Station, St. Paul.

——— 1935 Morning Versus Evening Deer Counts. Forest Research Digest, January 1935, Lake States Forest Experiment Station.

——— 1935 The Seasonal Food Habits of the Snowshoe Hare. Forest Research Digest, p. 7, May 1935, Lake States Forest Experiment Station.

——— 1935 Winter Habits of Deer. Forest Research Digest, p. 6, July 1935, Lake States Forest Experiment Station.

Aldous, C. M.
1935 Game Food Plantings. Forest Research Digest, pp. 8-9, September 1935, Lake States Forest Experiment Station.

Anon.
1935 Brush Fences Facilitate Rabbit Snaring. Forest Research Digest, p. 1, November 1935, Lake States Forest Experiment Station.

——— 1936 Bark Injury by Feeding Rodents. Forest Research Digest, p. 8, illus., January-February 1936, Lake States Forest Experiment Station.

——— 1936 Rabbit or Deer Damage. Forest Research Digest, p. 10, illus., January-February 1936, Lake States Forest Experiment Station.

——— 1936 Woody Food Preferences of the Snowshoe Rabbit in the Lake States. Technical Note No. 109, January 1936, Lake States Forest Experiment Station.

Aldous, C. M.
1936 Food Habits of Lepus Americanus Phaeonotus. Journal Mamm., Vol. 17, No. 2, p. 175.

Anon.
1936 Squirrels Versus Jack Pine. Forest Research Digest, pp. 2-3, September-October 1936, Lake States Forest Experiment Station.

——— 1937 Damage from Rabbits. A Consideration in Shelterbelt Planting. Technical Note No. 121, January 1937, Lake States Forest Experiment Station.

Aldous, C. M.
1937 Notes on the Life History of the Snowshoe Hare. Journal Mamm., Vol. 18, No. 1, pp. 46-57, illus.

Anon.
1937 Rodents and Direct Seeding. Forest Research Digest, pp. 18-19, Summer 1937, Lake States Forest Experiment Station.

Aldous, Shaler E.
1937 A Hibernating Black Bear with Cubs. Journal Mamm., Vol. 18, No. 4, pp. 466-468.

Anon.
1938 Food Habits of Minnesota Deer. Technical Note No. 133, February 1938, Lake States Forest Experiment Station.

——— 1938 Deer Damage to Jack Pine Plantation in Minnesota. Forest Research Digest, pp. 4-5, Spring 1938, Lake States Forest Experiment Station.

——— 1938 Beaver Feeding Experiment--Minnesota. Forest Research Digest, pp. 10-13, Spring 1938, Lake States Forest Experiment Station.

——— 1938 "It's an Ill Wind---." Forest Research Digest, pp. 14-15, Spring 1938, Lake States Forest Experiment Station.

Aldous, Shaler E. and Clarence F. Smith
1938 Food Habits of Minnesota Deer as Determined by Stomach Analysis. Transactions of the Third North American Wildlife Conference, pp. 215-222.

Aldous, Shaler E.
1938 Beaver Food Utilization Studies. Journal Wildlife Management, Vol. 2, No. 4, pp. 215-222.

———— 1938 It's An Ill Wind That Blows No Good. Minnesota Conservationists. No. 54, p. 33, February 1938.

Anon
1939 Squirrels Versus Black Spruce. Forest Research Digest, pp. 15-16, Winter 1939, Lake States Forest Experiment Station.

Aldous, Shaler E. and Clarence F. Smith
1939 Fall and Winter Food Habits of Deer in Northeastern Minnesota. Wildlife Research and Management Leaflet, B.S. 137, U.S.D.A. Biol. Survey.

Aldous, Shaler E.
1939 Pine in the Diet of Deer. Journal Forestry, Vol. 37, No. 3, pp. 265-267, illus.

_____ 1939 Minnesota Big Game Animals. University of Minnesota, Wildlife Conservation Short Course. May 1939. Published in Nature Notes, Minneapolis Public Library Museum, Vol. 2, No. 12.

_____ 1940 A Method of Marking Beavers. Journal of Wildlife Management, Vol. 4, No. 2, pp. 145-148.

Kalmbach, E. R. and Shaler E. Aldous
1940 Winter Banding of Oklahoma Crows. Wilson Bulletin, Vol. 52, No. 3, pp. 198-206, September 1940.

Aldous, Shaler E.
1940 The Beaver in Minnesota, a Resource and Responsibility. University of Minnesota, Wildlife Conservation Short Course, March 1940, Pub. by Minnesota Wildlife Federation, pp. 14-17.

Anon.
1940 White Cedar for Deer Food. Technical Note No. 159, May 1940, Lake States Forest Experiment Station.

____ 1941 The Animal Factor in Natural Reproduction of Jack Pine. Technical Note No. 172, January 1941, Lake States Forest Experiment Station.

Krefting, Laurits W.
1941 Methods of Increasing Deer Browse. Journal Wildlife Management, Vol. 5, No. 1, pp. 95-102.

Aldous, Shaler E.
1941 Food Habits of Chipmunks. Journal Mamm., Vol. 22 (1), pp. 18-24.

_____ 1941 Deer Management Suggestions for Northern White Cedar Types. Journal of Wildlife Management, Vol. 5, No. 1, pp. 90-94, January 1941.

_____ and J. Manweiler
1942 The Winter Food Habits of the Short-tailed Weasel in Northern Minnesota. Journal Mamm., Vol. 23, No. 3, pp. 250-255.

_____ 1942 Winter Deer Food Problem. Conservation Volunteer, Minnesota Conservation Department, Vol. 5, No. 27, pp. 37-39.

Aldous, Shaler E.
1943 Sharp-tailed Grouse in the Sand Dune Country of North Central North Dakota. Journal Wildlife Management, Vol. 7, No. 1, pp. 23-31, illus.

Aldous, Clarence M. and Shaler E. Aldous
1944 The Snowshoe Hare - A Serious Enemy of Forest Plantations. Journal of Forestry, Vol. 42, No. 3, pp. 88-94, illus.

Aldous, Shaler E.
1944 A Deer Browse Survey Method. Journal Mamm., Vol. 25, No. 2, pp. 130-136.

LeBarron, Russell K. and Shaler E. Aldous
1945 Jack Pine Versus Deer Browse. Conservation Volunteer, Vol. 8, No. 48, pp. 23-24, illus.

Aldous, C. M.
1946 Box Trap for Snowshoe Hares and Small Rodents. Journal Wildlife Management, Vol. 10, No. 1, pp. 71-72.

Aldous, Shaler E.
1946 Jack Pine Regeneration Retarded by Rodents and Birds. Technical Note No. 259, July 1946, Lake States Forest Experiment Station.

Harris, Dave and Shaler E. Aldous
1946 Beaver Management in the Northern Black Hills of South Dakota. Journal Wildlife Management, Vol. 10, No. 4, pp. 348-353.

Aldous, Shaler E. and Laurits W. Krefting
1946 The Present Status of the Isle Royale Moose. Trans. Eleventh North American Wildlife Conference, pp. 296-308.

Smith, Clarence F. and Shaler E. Aldous
1947 The Influence of Mammals and Birds in Retarding Artificial and Natural Reseeding of Coniferous Forests in the United States. Transmitted to the Journal of Forestry for publication.